

CEE 551
Reliability of Civil Engineering Systems

- Catalog data:** 20-CEE-551. Reliability of Civil Engineering Systems. 3 ug. cr.
Exploratory data analysis, regression and correlation, system reliability, first-order analysis of uncertainty, maximum entropy, load and resistance factor design, Monte Carlo simulation.
- Prerequisites:** Senior standing
- Textbook:** Harr, (1987) *Reliability-Based Design in Civil Engineering*, McGraw-Hill Book Company, New York
- References:** Haldar and Mahadevan (2000) *Probability, Reliability and Statistical Methods in Engineering Design*, John Wiley and Sons, 304 pages
- Coordinator:** Dr. Steven G. Buchberger, 770 ERC, 513-556-3681
Steven.Buchberger@uc.edu
- Goals:** To introduce Civil Engineering students to basic concepts that aid understanding and encourage implementation of risk and reliability based methods for evaluating, designing and operating CE projects. Five detailed case studies demonstrate application of ideas.
- Lecture or lab topics:**
1. Review of basic principles from probability and statistics (6 classes)
 2. Frequency analysis of CE phenomena (3 classes)
 3. Evaluating risk and reliability of CE systems (6 classes)
 4. Monte Carlo simulation of CE systems (3 classes)
 5. Uncertainty and entropy principles in CE analysis (3 classes)
 6. Detailed CE case studies (5 classes)
 7. Guest lectures on CE reliability (2 classes)
 8. Exam (1 class)
- Computer usage:** Three interactive programs are used in class and in the homework. STATGRAPHICS is used to demonstrate visual convergence to normality as claimed by the central limit theorem. The random number generator option in EXCEL is used to perform a realistic Monte Carlo simulation as part of a reliability-based design for a municipal water supply reservoir. The program DICE is used to illustrate the concept of uncertainty analysis and to demonstrate moments and probability distributions that arise from functions of random design variables.
- ABET criterion 3:** a, c, g, j, k
- ABET criterion 8:** a, e, f
- Date prepared:** December 20, 2002 , Last Update April 25, 2007